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(54) **RADIANT BODY AND METHOD FOR MAKING THE RADIANT BODY**

(57) Described is a radiant body (1) comprising a plurality of base modules (10) which are contiguous and with a mutual centre-to-centre distance (C), to form the radiant body (1) having a length (L) and a pair of monolithic junction bodies (20, 21), with a tubular cross-section, for the support, above and below, and for the connection in a sealed fashion of the base modules (10); each junction body (20, 21) engaging a corresponding first (14) or second (15) head of each module (10) at two upper paths (16, 17) of the base modules (10) arranged side by side; each junction body (20, 21) is hollow inside and provided with a plurality of radial openings (30) positioned along the relative cylindrical surface, at a distance (D) from each other equal to the centre-to-centre (C) of the base modules (10); the openings (30) are positioned, in use, facing the central lower third path (18).

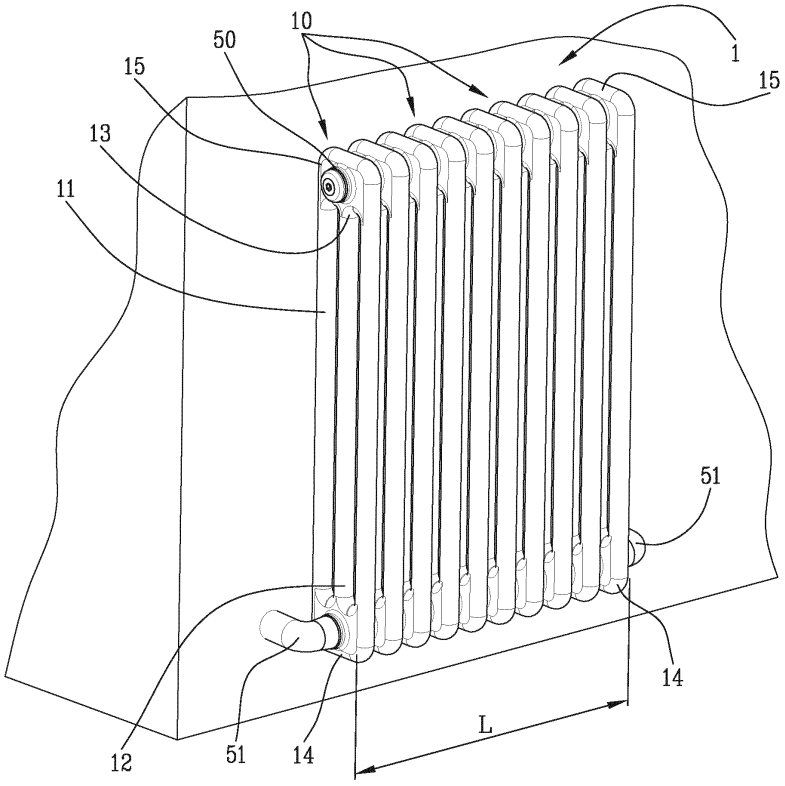

Fig.1

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Description

[0001] This invention relates to a radiant body and a method for making the radiant body.

[0002] More specifically, reference will be made to a radiant body which can be used for heating rooms, especially areas for living or industrial use.

[0003] Such a type of radiant body, which is usually applicable to a wall in a suspended fashion, is described, for example, in patent document EP854347 and comprises several base modules which are associated with each other to define the radiant body of the appropriate size for the volume of the room to be heated.

[0004] Each module basically comprises: a tubular element mainly with longitudinal extension, internally hollow to configure a duct; a first head and a second head associable stably to the corresponding ends of the tubular element; each head comprises a body configured with a "T" shape internally hollow to form a 3-way passage channel.

[0005] The two upper paths are facing and coaxial to each other and positioned at right angles to the third central lower path.

[0006] The third central path is configured for coupling with the above-mentioned duct, so that the duct itself and the two heads at the relative ends form the base module.

[0007] The coupling between the above-mentioned elements usually occurs by welding.

[0008] The number of ducts of each module, as well as their shape, may vary as a function of both design and installation requirements: however, this does not entail any basic variations to the above-mentioned definition of the base module.

[0009] To be able to proceed to the coupling of two or more base modules to define the radiant body of the desired size, one of the prior art solutions contemplate that both the heads, at the first two upper paths, are equipped with an inner thread: this is obtained by machining after the forming of the heads themselves, which, usually, are obtained by means of moulding. The outside faces of the heads, where there is the thread, are flat.

[0010] For the connection between two adjacent modules, use is made of a joining element or piece (known to experts in the sector as "nipples"), which is also tubular, internally hollow, and provided on the outside with a double thread in opposite directions; an annular seal (O-Ring type) is positioned between the two threads which will act as a seal to the passage of fluid.

[0011] The production of the radiant body therefore occurs by screwing, to the two heads of each module, corresponding connecting pieces with interposed the respective seal; the operation is then repeated for the second, third module and so on, up to the desired size. Lastly, the upper outer paths are closed by respective closing plugs, leaving open the ends intended for the inlet or outlet of the heating liquid.

[0012] The seal between two consecutive modules is entirely entrusted to the seal which is pressed, following the assembly of the heads-joining piece, between the outer flat walls facing each other of the heads themselves.

[0013] A drawback of this type construction consists in the undoubted slowness in the production of the radiant body, especially if the radiant body consists of a large number of base modules, since it is necessary to use many joining pieces; this requiring lengthy intervention times and precision in order to make a body with a perfect seal.

[0014] A further drawback is due to the need to carry out, on the heads, machining which is particularly delicate and in need of precision, such as the above-mentioned inner threads of the first two paths of the heads themselves.

[0015] The aim of this invention is to provide a radiant body which overcomes the above mentioned disadvantages of the prior art.

[0016] More specifically, the aim of this invention is to provide a heating body which is able to allow a facilitated fitting of the elements making up the individual modules, thereby reducing the time needed for assembling and forming the heating body until obtaining the required dimensions.

[0017] A further aim of this invention is to propose a method for making the radiant body which is able to assemble the radiant body very quickly.

[0018] These aims are fully achieved by the radiant body according to this invention as characterised in the appended claims.

[0019] The features of the invention will become more apparent from the following detailed description of a preferred, non-limiting embodiment of it, illustrated by way of example in the accompanying drawings, in which:

- Figure 1 is a perspective view of a radiant body according to the invention;
- Figure 2 is an exploded perspective view of the basic components for the production of the radiant body according to the invention;
- Figure 3 is an exploded perspective view of an alternative embodiment of the components for the production of the radiant body according to the invention;
- Figure 4 is an enlarged detail of Figure 2;
- Figure 5 is a cross section of a part of the components of the assembled radiant body according to the invention;
- Figure 6 is an enlarged detail of Figure 6.

[0020] With reference to the accompanying drawings, the radiant body according to the invention (shown in its entirety in Figure 1 in a configuration of use) is denoted in its entirety by the numeral 1.

[0021] The radiant body 1 is formed by a plurality of base modules 10 adjacent to each other and with a centre-to-centre distance C in such a way as to form a radiant body 1 having a length L.

[0022] Each base module 10 comprises at least one tubular element 11 with a mainly longitudinal extension, internally hollow, to configure a duct provided with two end 12, 13 (the modules illustrated in the accompanying drawings have several ducts 11, more specifically, three, by way of example and also shaped differently to each other as a function of the design needs of the radiant body).

[0023] Each module 10 also comprises a first head 14 and a second head 15, associated stably to the corresponding ends 12, 13 of the tubular element 11.

[0024] Each of the heads 12 and 13 comprises a body configured with a "T" shape internally hollow to form a passage channel defined by a first, a second and a third path labelled 16, 17 and 18.

[0025] The first and second path 16, 17 face each other, are coaxial and lead outside in respective outer side walls 14p, 15p.

[0026] The first and second paths 16, 17 are positioned at right angles to the third central path 18.

[0027] The third central path 18 is associated with the duct 11 (in this way, the duct 11 and the two end heads 12 and 13 configure the base module 10).

[0028] As illustrated (see Figures 2 to 6), the radiant body 1 comprises a pair of junction bodies 20, 21, each monolithic and with a tubular cross-section for the support, above and below, and for the connection in a sealed fashion of the base modules 10.

[0029] Each junction body 20, 21 engages (coaxially) a corresponding first 14 or second 15 head of each module 10 at two upper paths 16, 17 of the base modules 10 arranged side by side.

[0030] Each junction body 20, 21 is hollow inside and provided with a plurality of radial openings 30 positioned along the relative cylindrical surface, at a distance D from each other equal to the centre-to-centre C of the base modules 10. The openings 30 are positioned, in use, facing the third central path 18.

[0031] Each first 15 and second 16 head is configured for define an housing zone of sealing members 40.

[0032] The sealing members 40 are bilaterally arranged on each of the first 15 and second 16 head, so as to create a direct seal between the first 15 or second 16 head and the section of the corresponding junction body 20, 21.Thanks to these junction bodies, the radiant body has an extremely simplified structure, since also in the presence of a significant plurality of base modules, their joining is obtained with only two junction components which are able to simplify and lighten the final structure.

[0033] Preferably, the radiant body 1 comprises a first annular seal 40 positioned between each side wall 14p and 15p of each first and second head 14, 15 and each junction body 20, 21.

[0034] In light of this, each first or second head 14, 15 has the corresponding side wall 14p, 15p equipped with an annular chamfer 14s, 15s.

[0035] It should be noted that each seal 40 is housed, in use, between two chamfers 14s, 15s facing each other of two separate base modules 10 side by side, to form, together with the outer surface of the corresponding junction body 20, 21, a sealing zone.

[0036] Thanks to this structure, the radiant body is assured an extremely secure seal and, in the event of wear it is possible to perform maintenance quickly and safely.

[0037] Preferably, the radiant body 1 comprises first closing means 50 and second means 51 for conveying a fluid positioned at corresponding free ends of the junction bodies 20 and 21.

[0038] It should be noted that the junction bodies 20, 21 are provided, at their free ends, with internal threads 20f, 21 f.

[0039] In light of this, the first closing means 50 and the second means 51 for conveying a fluid are provided with corresponding external threads 50f and 51f which can be screwably coupled with the above-mentioned internal threads 20f, 21 f of the junction bodies 20, 21.

[0040] In the case illustrated, the first closing means 50 comprise terminals in the form of a cap provided with a threaded shaft screwing to the corresponding closing body 20 or 21.

[0041] Again in the case illustrated, the second fluid passage means 51 comprise feed ducts provided with one end having the outer thread.

[0042] Preferably, the first means 50 for closing the passage of the fluid inside the radiant body are provided with respective second seals 55.

[0043] Again preferably, the second fluid passage means 51 are provided with respective third seals 56.

[0044] In light of this, the first closing means 50 and the second means 51 for conveying a fluid are provided with contact surfaces or shoulders 50b and 51 b, with a diameter larger than the diameter of the respective thread zone, to configure an abutment for the relative second and third seals 55, 56.

[0045] It should be noted that each junction body 20, 21 defines a module of length L1 at least equal to the length L given by the sum of the base modules 10 alongside forming the radiant body 1.

[0046] For example, in the simplest embodiment, the junction bodies 20, 21 may have a length L1 equal to n times the centre-to-centre distance C of the two consecutive base modules 10.

[0047] These dimensions will correspond to those which are normally defined as standard dimensions of a radiant body of normal use.

[0048] Preferably, the radiant body 1 comprises at least one pair of tubular connecting elements 60 configured to connect to the pair of junction bodies 20, 21 in such a way as to modify the length of the junction bodies 20, 21 according to the maximum number of base modules 10 forming the radiant body 1 (see Figure 3).

[0049] In light of this, each tubular connecting element 60 is equipped with threads 61 at the relative ends and with at least one radial hole 62 for passage of fluid.

[0050] In short, these connecting elements 60 can be

used if there is the need to form larger radiant bodies 1 which are, for example, outside the normal standard.

[0051] The connecting elements 60, may therefore be associated with the ends of the two junction bodies 20, 21 up to obtaining the desired length of the entire radiant body and forming the same function as the junction piece to which they are connected.

[0052] It is worth noting how, through the solution according to this invention, it is possible to achieve a reduction in both the costs of the radiant body, and the times for its production, that is to say, the assembly of the various modules necessary.

[0053] In fact:

- the production of the first and second heads 12 and 13 is simpler since they do not have any inner thread and have only the deformation for making of the above-mentioned chamfers 14s, 15s;
- the joining between adjacent base modules 10 is performed entirely by the two junction bodies 20 and 21 which are inserted inside all the heads of all the base modules affected with the interposing of the first seals 40;
- the closing and the definitive seal of the set of base modules to define the radiant body 1 will be achieved by the insertion and the screwing (at the threaded ends of the junction bodies 20 and 21) of the first closing means 50 and respective second seals 55 and of the second passage means 51 and respective third seals 56.

[0054] For this purpose, this invention provides a method for assembling the radiant body 1.

[0055] The method comprises the following steps:

- preparing a first base module 10;
- inserting the corresponding junction bodies 20, 21 in the first and second head 14, 15 of the base module 10 along the first two paths 16, 17, and in such a way as to position a corresponding opening 30 of each junction body 20, 21 inside the corresponding first and second head 14, 15;
- inserting corresponding first seals 40 on opposite sides to the first and second head 14, 15;
- inserting at least a second base module 10, alongside the first base module 10, inserting the respective first and second head 14, 15 in the corresponding junction bodies 20, 21 through the first two paths 16, 17, until obtaining a compaction of the two contiguous modules 10 and a flattening of at least a corresponding first seal 40 between the chamfers 14s, 15s of the first or second heads 14, 15 and the outer surface of the junction bodies 20, 21;
- associating, by screwing, first closing means 50 and second means 51 for conveying a fluid to the corresponding end of the junction bodies 20, 21 to close the assembly thereby made.

[0056] The invention therefore achieves the present aims, in particular as regards the simplicity and the shorter time necessary for the definition of the radiant body, starting from a plurality of modules.

Claims

1. A radiant body (1) comprising a plurality of base modules (10) which are contiguous and with a mutual distance (C), to form the radiant body (1) having a length (L), each base module (10) comprising:

- at least one tubular element (11) with a mainly longitudinal extension, internally hollow, to configure a duct provided with two ends (12, 13);
- a first head (14) and a second head (15), associated stably to the corresponding ends (12, 13) of the tubular element (11); each head (14, 15) comprising a body configured with an internally hollow "T" shape to form a transit channel defined by a first, second and third path (16, 17, 18); the first and second path (16, 17) facing each other, coaxial and leading outside in respective side walls (14p, 15p), the first and second path (16, 17) being positioned at right angles to the central third path (18); the third central path (18) being associated with the tubular element (11),

characterised in that it comprises a pair of junction bodies (20, 21) each monolithic and with a tubular cross-section for the support, above and below, and for the connection in a sealed fashion of the base modules (10); each junction body (20, 21), engaging a corresponding first (14) or second (15) head of each base module (10) at the two upper paths (16, 17) of the base modules (10) arranged side by side; each junction body (20, 21) being hollow inside and provided with a plurality of openings (30) positioned radially along the relative cylindrical surface, at a distance (D) from each other equal to the distance (C) of the base modules (10); the openings (30) being positioned, in use, facing the third central path (18); each first (15) and second (16) head being configured for define an housing zones of sealing members 40, the sealing members 40 are bilaterally arranged on each of the first (15) and second (16) head so as to create a direct seal between the first 15 or second 16 head and the section of the corresponding junction body 20, 21.

2. The radiant body according to claim 1, comprising a first annular seal (40) positioned between each side wall (14p, 15p) of each first and second head (14, 15) and each junction body (20, 21).

3. The radiant body according to claim 1 or 2, wherein

each first or second head (14, 15) has the corresponding side wall (14p, 15p) equipped with an annular chamfer (14s, 15s), and wherein each seal (40) is housed, in use, between two chamfers (14s, 15s) facing each other of two separate base modules (10) side by side, to form, together with the outer surface of the corresponding junction body (20, 21), a sealing zone.

4. The radiant body according to any one of the preceding claims, comprising first closing means (50) and second means (51) for conveying a fluid positioned at corresponding free ends of the junction bodies (20, 21).

5. The radiant body according to claim 4, wherein the junction bodies (20, 21) are provided, at their free ends, with internal threads (20f, 21f) and wherein the first closing means (50) and the second means (51) for conveying a fluid are provided with corresponding external threads (50f, 51 f) which can be screwably coupled with the above-mentioned internal threads (20f, 21 f) of the junction bodies (20, 21).

6. The radiant body according to claim 4 or 5, wherein the first means (50) for closing the passage of the fluid inside the radiant body are provided with respective second seals (55).

7. The radiant body according to claim 4 or 5, wherein the second means (51) for passage of the fluid are provided with respective third seals (56).

8. The radiant body according to any one of claims 4 to 7, wherein the first closing means (50) and the second means (51) for conveying a fluid are provided with contact surfaces or shoulders (50b, 51 b), with a diameter larger than the diameter of the respective thread zone, to configure an abutment for the relative second and third seals (55, 56).

9. The radiant body according to any one of the preceding claims, wherein each junction body (20, 21) defines a length module (L1) at least equal to the length (L) given by the sum of base modules (10) side by side predetermined to form the radiant body (1).

10. The radiant body according to any one of the preceding claims, comprising at least one pair of tubular connecting elements (60) configured to connect to the pair of junction bodies (20, 21) in such a way as to modify the length of the junction bodies (20, 21) according to the maximum number of base modules (10) forming the radiant body (1).

11. The radiant body according to claim 10, wherein each tubular connecting element (60) is equipped with threads (61) at the relative ends and with at least one radial hole (62) for passage of fluid.

12. A method for making a radiant body according to any one of claims 1 to 11, **characterised in that** it comprises the following steps:

- preparing a first base module (10);
- inserting the corresponding junction bodies (20, 21) in the first and second head (14, 15), along the first two paths (16, 17), and in such a way as to position a corresponding opening (30) of each junction body (20, 21) inside the corresponding first and second head (14, 15);
- inserting corresponding first seals (40) on opposite sides to the first and second head (14, 15);
- inserting at least a second base module (10), alongside the first base module (10), inserting the respective first and second head (14, 15) in the corresponding junction bodies (20, 21) through the corresponding first two paths (16, 17) until obtaining a compaction of the two contiguous modules (10) and a flattening of a corresponding first seal (40) between the chamfers (14s, 15s) of the first or second heads (14, 15) and the outer surface of the junction bodies (20, 21);
- associating, by screwing, first closing means (50) and second means (51) for conveying a fluid to the corresponding end of the junction bodies (20, 21) to close the assembly thereby made.

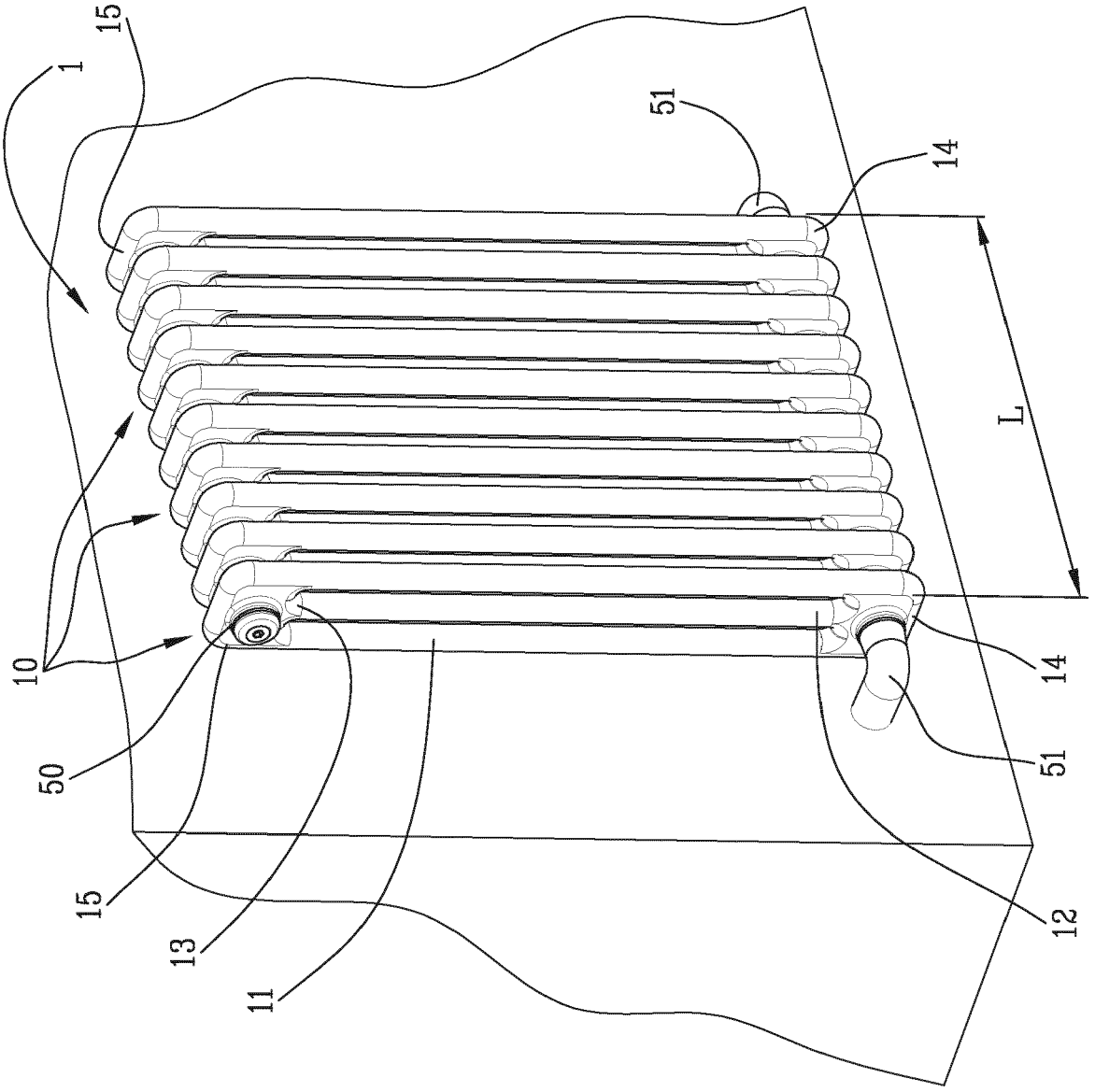

Fig.1

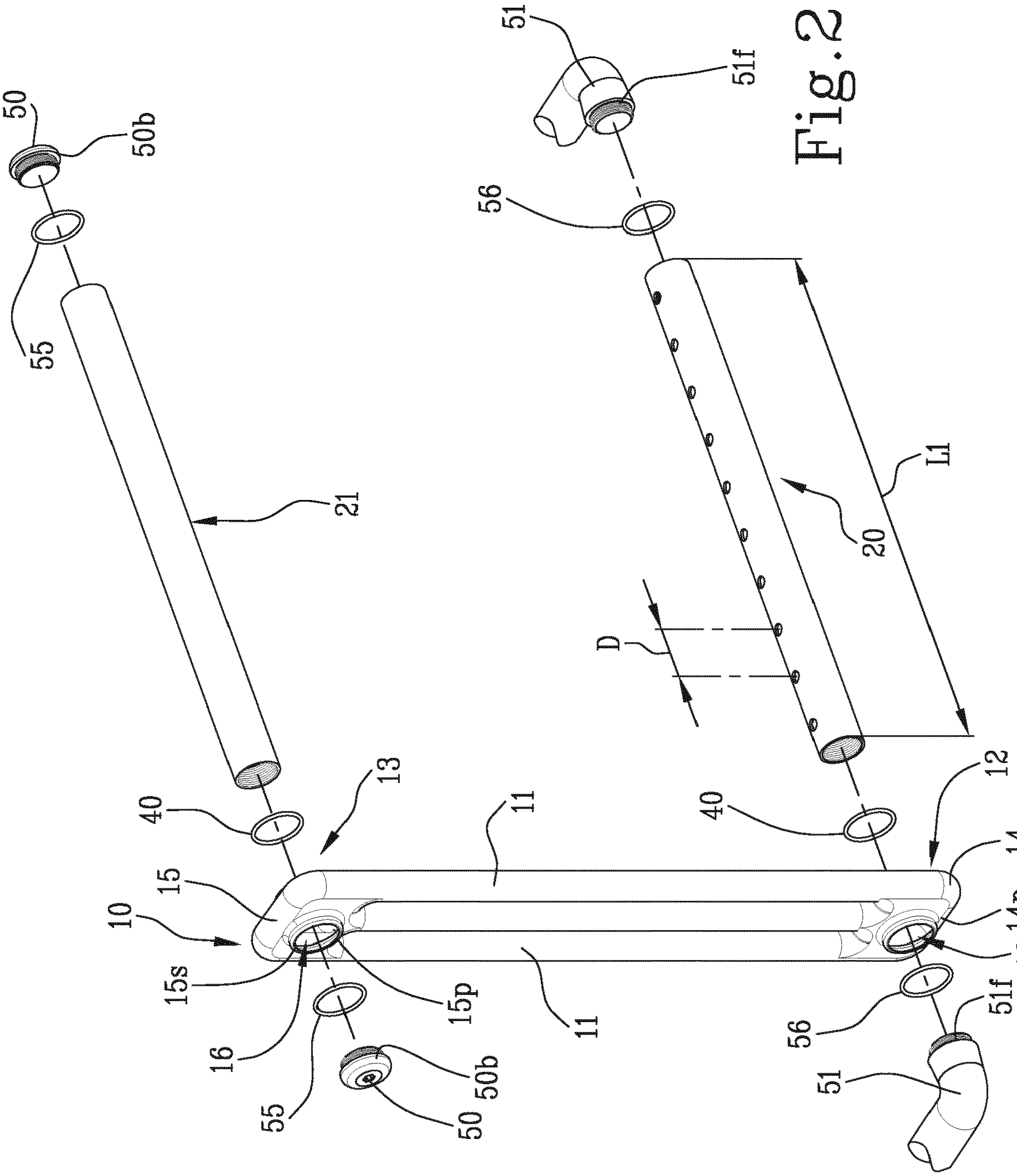
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Fig.2

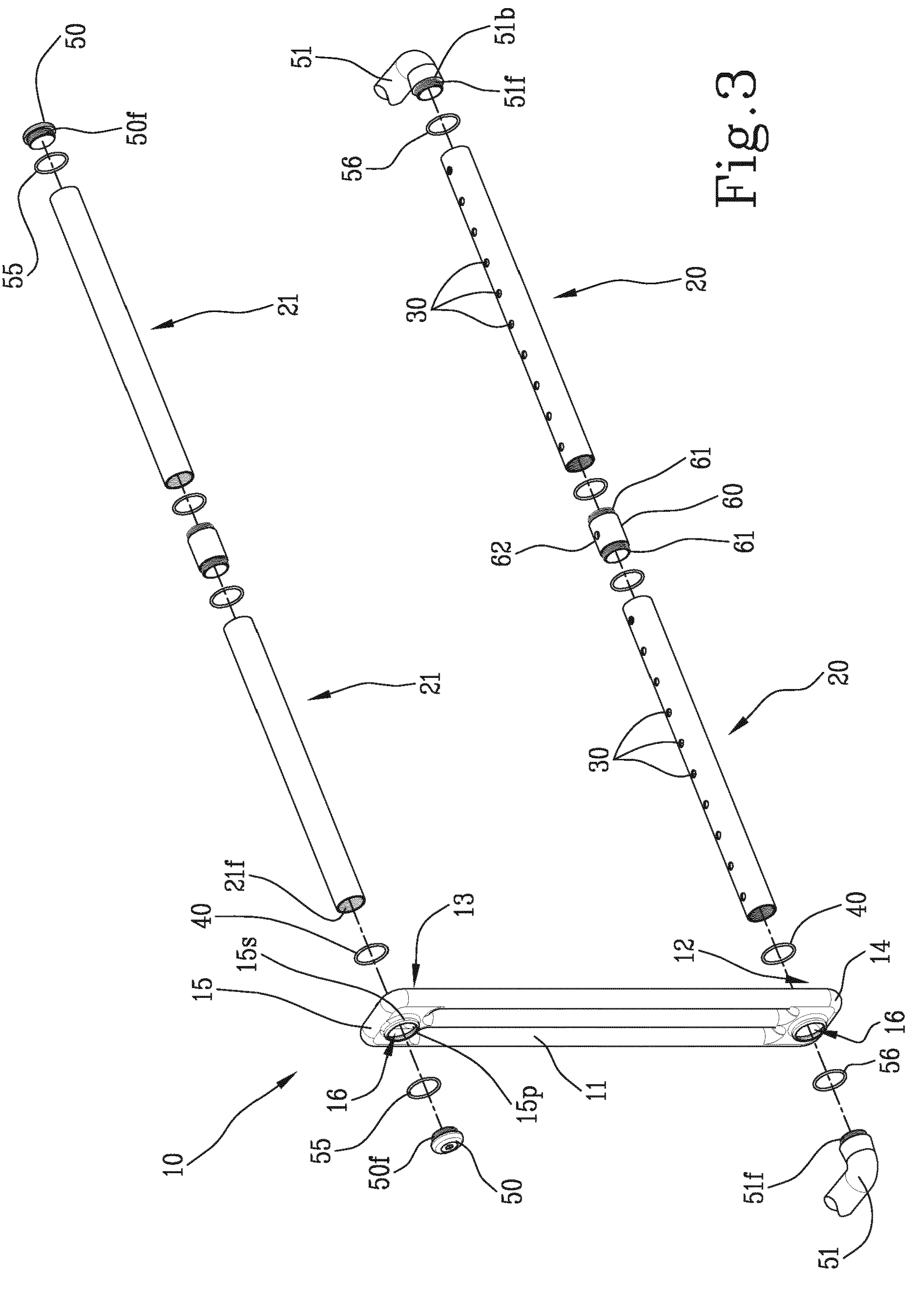
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Fig.3

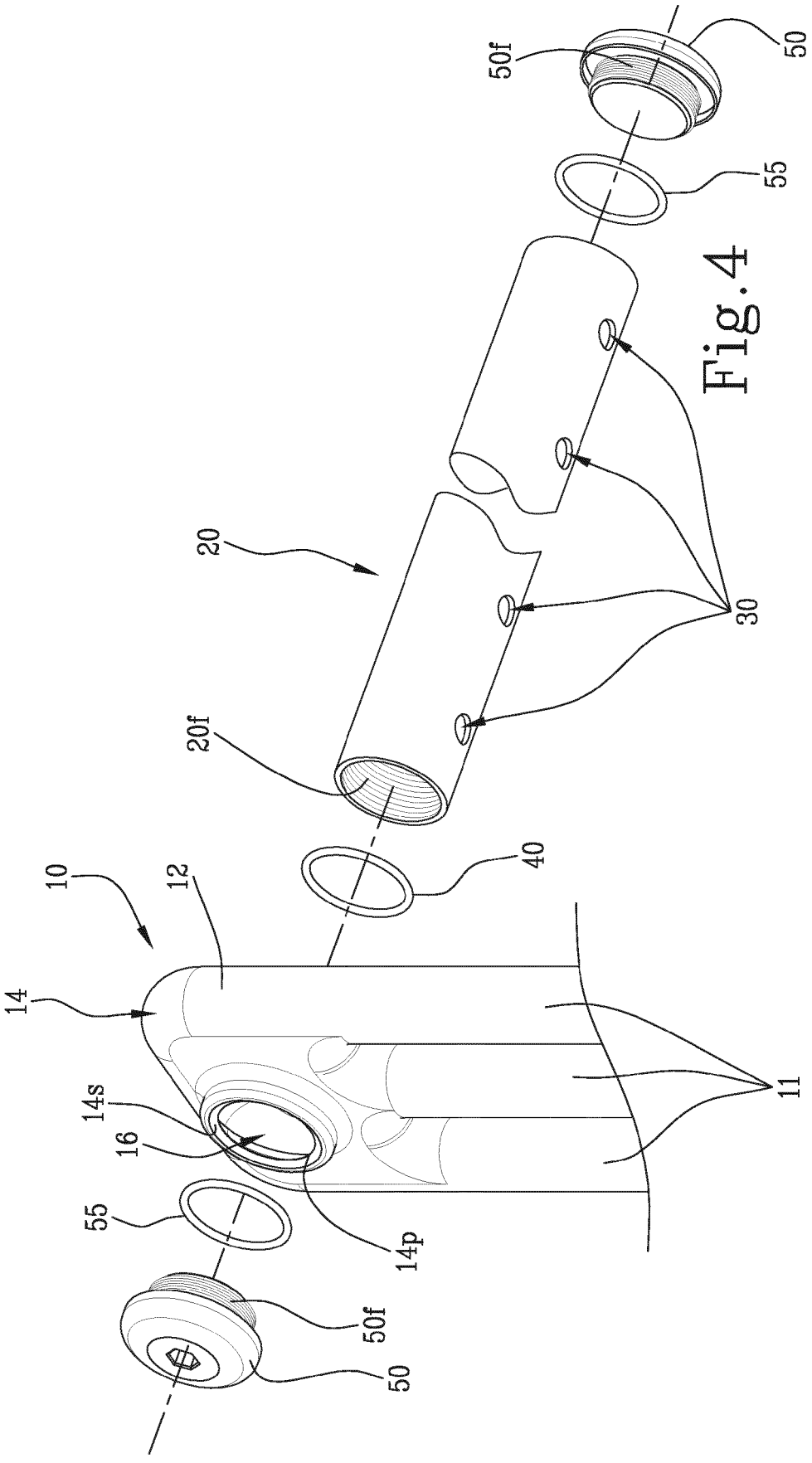
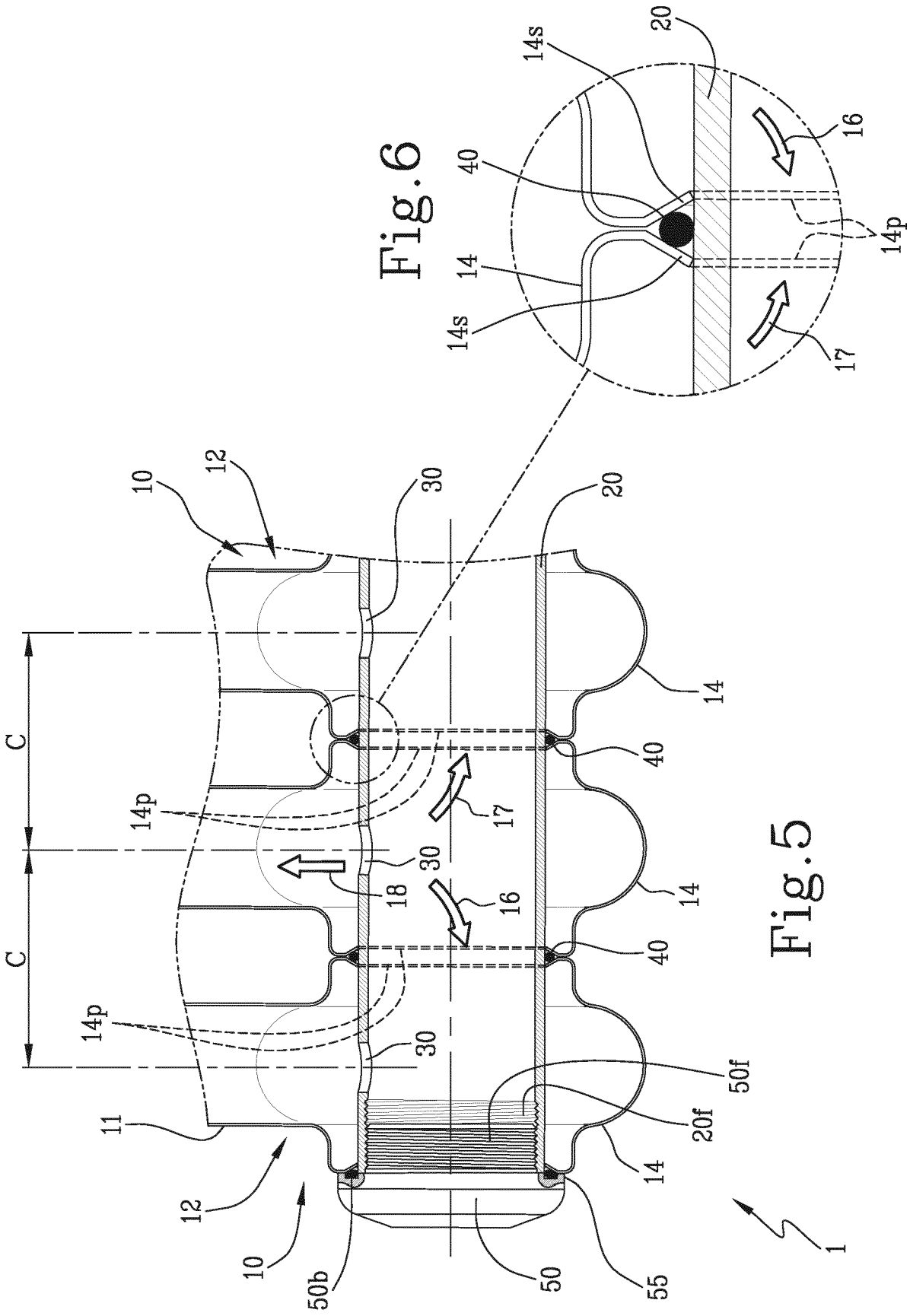


Fig.4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14p
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Fig.5

14
14s
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17
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40
14p

Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 0623

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2007/012929 A1 (DELTA T KALOR S R L K [IT]; PASCHETTO ADRIANO [IT]) 1 February 2007 (2007-02-01) * page 12, line 7 - page 14, line 25; figure 1 * -----	1-12	INV. F28F9/26 F28D1/053 F28F9/02 F24D19/00
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A	GB 285 524 A (CHARLES HAROLD POTTS) 8 February 1928 (1928-02-08) * page 3, line 61 - page 4, line 49; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

F28D
F28F
F24D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 October 2017	Arndt, Markus

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13-10-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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